



Department of Energy

Oak Ridge Operations Office
P.O. Box 2001
Oak Ridge, Tennessee 37831—

August 6, 2002


Dr. Lee A. Barclay, Ph.D.
Field Supervisor
Fish and Wildlife Service
446 Neal Street
Cookeville, Tennessee 38501

Dear Dr. Barclay,

INFORMAL CONSULTATION UNDER SECTION 7 OF THE ENDANGERED SPECIES ACT, BIOLOGICAL ASSESSMENT FOR IMPLEMENTATION OF A COMPREHENSIVE MANAGEMENT PROGRAM TO STORE, TRANSPORT, AND DISPOSE OF POTENTIALLY RE-USABLE URANIUM MATERIALS

Please find enclosed a copy of a Biological Assessment (BA) for Threatened and Endangered Species under Section 7 of the Endangered Species Act for Implementation of a Comprehensive Management Program to Store, Transport, and Dispose of Potentially Re-Usable Uranium Materials. This BA was prepared in response to a request by the U. S. Fish and Wildlife Service (USFWS), (Letter from Dr. Lee A. Barclay, U. S. Fish and Wildlife Service, Cookeville, Tennessee, to Mr. David Allen, U. S. Department of Energy (DOE), Oak Ridge, Tennessee, June 10, 2002). The BA addresses three species identified by the USFWS -- the gray bat, the Indiana bat and the pink mucket -- in the aforementioned letter. Both the Y-12 National Security Complex and the East Tennessee Technology Park are being considered by the DOE as potential interim storage sites for consolidation of approximately 14,200 MTU of uranium materials in the Uranium Management Group inventory.

DOE staff conclude, based on the information presented in this BA, that implementation of the proposed action at either site on the Oak Ridge Reservation (ORR) is not likely to adversely affect any of the listed species because the proposed action involves potential warehouse construction on already developed, industrialized areas on the ORR. The ORR does not contain any proposed or designated critical habitat for the gray bat or the Indiana bat, so none would be affected. In addition, any potential adverse impacts to the Indiana bat would be expected to be negligible due to the lack of suitable summer roosting habitat at both sites. Although the ultimate use of either site may eventually require the removal of trees, any potential roosting habitat at the site is, at best, marginal. Also, there are adequate numbers of suitable and potentially suitable roost trees available immediately adjacent to the two sites. The proposed action would not affect any potentially suitable habitat for the pink mucket in the Clinch River or its tributaries. It is unlikely that the proposed action would result in any off-site releases of sediment or potential contaminants that would adversely affect this mussel. DOE requests the concurrence of the USFWS with these conclusions.

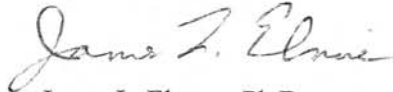
 PRINTED ON RECYCLED PAPER

Dr. Lee A. Barclay, Ph.D.

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This letter is intended to serve as informal consultation under Section 7 of the Endangered Species Act. If you need further information, please call me at (865) 576-0938. Thank you in advance for your prompt reply.

Sincerely,

A handwritten signature in cursive script, appearing to read "James L. Elmore".

James L. Elmore, Ph.D.
Alternate NEPA Compliance Officer

Enclosure

cc:

David Allen, SE-30-1

Carolyne Thomas, NU-51

Wayne Tolbert, SAIC, Oak Ridge



United States Department of the Interior

FISH AND WILDLIFE SERVICE

446 Neal Street
Cookeville, TN 38501

September 18, 2002

Mr. James L. Elmore, Ph.D.
U.S. Department of Energy
Oak Ridge Operations Office
P.O. Box 2001
Oak Ridge, Tennessee 37831

Dear Dr. Elmore:

Thank you for your letter and enclosure of August 6, 2002, transmitting the Biological Assessment (BA) for the Implementation of a Comprehensive Management Program to Store, Transport, and Dispose of Potentially Re-Usable Uranium Materials at the Y-12 National Security Complex and the East Tennessee Technology Park in Oak Ridge, Roane and Anderson Counties, Tennessee. U.S. Fish and Wildlife Service (Service) personnel have reviewed the information submitted and offer the following comments for consideration.

The BA is adequate and supports the conclusion of not likely to adversely affect, with which we concur. In view of this, we believe that the requirements of Section 7 of the Endangered Species Act (Act) have been fulfilled and that no further consultation is needed at this time. However, obligations under Section 7 of the Act must be reconsidered if: (1) new information reveals that the proposed action may affect listed species in a manner or to an extent not previously considered, (2) the proposed action is subsequently modified to include activities which were not considered in this biological assessment, or (3) new species are listed or critical habitat designated that might be affected by the proposed action.

Our previous comments of June 10, 2002, regarding the Programmatic Environmental Assessment (PEA) remain valid. We would appreciate further consideration of the issues presented therein.

These constitute the comments of the U.S. Department of the Interior in accordance with provisions of the Endangered Species Act (87 Stat. 884, as amended: 16 U.S.C. 1531 et seq.), the Migratory Bird Treaty Act (16 U.S.C. 703-711), the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.), and the National Environmental Policy Act (42 U.S.C. 4321-4347; 83 Stat. 852). We

appreciate the opportunity to comment. Should you have any questions or need further assistance, please contact Steve Alexander of my staff at 931/528-6481, ext. 210, or via e-mail at steven_alexander@fws.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Lee A. Barclay".

Lee A. Barclay, Ph.D.
Field Supervisor

xc: John Owsley, TDEC, Oak Ridge
Dave McKinney, TWRA, Nashville

Endangered Species Act

BIOLOGICAL ASSESSMENT

for

Implementation of a Comprehensive Management Program
for the Storage, Transportation, and Disposition of
Potentially Reusable Uranium Materials
at the Oak Ridge Reservation,
Oak Ridge, Tennessee

Prepared by
Science Applications International Corporation
151 Lafayette Drive
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Prepared for
U.S. Department of Energy
Oak Ridge Operations Office
Oak Ridge, Tennessee 37831

July 2002

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

Contributed to the preparation of this document and
should not be considered an eligible contractor for its review.

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ACRONYMS

BA	biological assessment
DOE	U.S. Department of Energy
DU	depleted uranium
EFPC	East Fork Poplar Creek
ETTP	East Tennessee Technology Park
FWS	U.S. Fish and Wildlife Service
LEFPC	Lower East Fork Poplar Creek
LEU	low enriched uranium
MTU	metric tons of uranium
NU	normal uranium
ORR	Oak Ridge Reservation
PEA	programmatic environmental assessment
TVA	Tennessee Valley Authority
UEFPC	Upper East Fork Poplar Creek
UMG	Uranium Management Group
Y-12 Complex	Y-12 National Security Complex

EXECUTIVE SUMMARY

This biological assessment (BA) assesses potential impacts on three federally listed animal species that could result from the implementation of a comprehensive management program to store, transport, and dispose of potentially reusable uranium materials by the U.S. Department of Energy (DOE) at one of two sites the Y-12 National Security Complex (hereafter referred to as the Y-12 Complex) or East Tennessee Technology Park (ETTP) on the Oak Ridge Reservation (ORR). The species discussed in this BA are those mentioned in comments received from the U.S. Fish and Wildlife Service (FWS) to DOE, dated June 10, 2002.² The FWS comments were specifically directed toward potential impacts resulting from implementing the proposed uranium management program on the ORR.

The three species include two listed endangered mammals, the gray bat (*Myotis grisescens*) and the Indiana bat (*Myotis sodalis*), and a listed endangered freshwater mussel, the pink mucket (*Lampsilis abrupta*). None of these species is likely to be present on either of the proposed sites, and proposed or designated critical habitats for the species are not present on or near either of the proposed sites. However, caves that could provide potential roosting habitat for the gray bat are present within 6.4 km (4 miles) of the ORR. Suitable roosting habitat for the Indiana bat is also present within the vicinity of the proposed project. In addition, the Clinch River (Melton Hill Reservoir), an impoundment on the Clinch River that forms the southern boundary of the ORR, and Poplar Creek, which flows through ETTP, provide suitable foraging habitat for the gray bat and Indiana bat. The pink mucket is known to occur in the Clinch River (Melton Hill Lake). All surface water from Y-12 Complex drainage eventually enters the Clinch River near ETTP. Both Bear Creek, a tributary to East Fork Poplar Creek (EFPC), and EFPC rise at the Y-12 Complex. EFPC flows into Poplar Creek, which flows through ETTP before entering the Clinch River.

DOE staff conclude, based on the information presented in this BA, that implementation of the proposed action at either site on the ORR is not likely to adversely affect any of the listed species because the proposed action involves potential warehouse construction on already developed, industrialized areas on the ORR. The ORR does not contain any proposed or designated critical habitat for the gray bat or the Indiana bat, so none would be affected. In addition, any potential adverse impacts to the Indiana bat would be expected to be negligible due to the lack of suitable summer roosting habitat at both sites. Although the ultimate use of either site may eventually require the removal of trees, any potential roosting habitat at the site is, at best, marginal. Also, there are adequate numbers of suitable and potentially suitable roost trees available immediately adjacent to the two sites. The proposed action would not affect any potentially suitable habitat for the pink mucket in the Clinch River or its tributaries. It is unlikely that the proposed action would result in any off-site releases of sediment or potential contaminants that would adversely affect this mussel. DOE requests the concurrence of the FWS with these conclusions.

²Letter from Dr. Lee A. Barclay, U.S. Fish and Wildlife Service, Cookeville, Tennessee, to Mr. David Allen, U.S. Department of Energy, Oak Ridge, Tennessee, June 10, 2002.

1. INTRODUCTION

This biological assessment (BA) only evaluates the effect of the proposed action on threatened and endangered species for two sites in Oak Ridge, the Y-12 National Security Complex (hereafter referred to as the Y-12 Complex) and East Tennessee Technology Park (ETTP) [Figure 1].

1.1 PURPOSE AND NEED FOR AGENCY ACTION

The U.S. Department of Energy (DOE) proposes to implement a comprehensive management program to safely, efficiently, and effectively manage its potentially reusable low enriched uranium (LEU), normal uranium (NU), and depleted uranium (DU). Uranium materials, which are presently located at multiple sites, are to be consolidated by transporting the materials to one, or several, storage locations to facilitate ultimate disposition. Management would include the storage, transport, and ultimate disposition of these materials.

This action is needed because of DOE's current missions and functions; increasing budget pressures; the continuing need for good stewardship of resources, including materials in inventory; and continuing DOE attention to considerations of environment, safety, and health. Also, increased pressure on the federal budget requires that DOE take a closer look at materials management in order to ensure maximum cost effectiveness. This includes an examination of feasible uses of this material, consistent with DOE's mission, as well as an examination of management methods that are consistent with environmental requirements and budgetary constraints. DOE needs to implement a long-term (greater than 20 years) management plan for its inventory of potentially reusable LEU, NU, and DU.

1.2 PROPOSED ACTION

DOE proposes to implement a long-term (greater than 20 years) management plan for its inventory of potentially reusable LEU, NU, and DU. Uranium materials, which are presently located at multiple sites, are to be consolidated by transporting the materials to one, or several, storage locations to facilitate ultimate disposition. The management plan will address the packaging and transport of potentially reusable uranium materials from DOE sites and university loan/lease returns and their receipt and storage at a site under cognizance of the Uranium Management Group (UMG). This action will also cover material shipment from the UMG and disposition. A Secretarial Determination is required, under certain conditions, for uranium in the UMG inventory to be sold. Twenty years will provide time for additional reviews required for any future related actions that may be desirable to help accomplish ultimate disposition. Impacts evaluated in Chapter 4 of the Draft Programmatic Environmental Assessment (PEA) prepared for this project (DOE 2002) cover the 20-year period of this management plan.

The management plan will cover uranium materials that are currently in the form of oxides, metals, and other stable compounds such as UF_4 . The quantity of uranium within the scope of this PEA is estimated to be 14,200 metric tons of uranium (MTU) and is primarily located at a few DOE locations (Idaho National Engineering and Environmental Laboratory, Portsmouth Gaseous Diffusion Plant, Savannah River Site, and Oak Ridge). These DOE locations have other uranium materials, which are not part of the UMG inventory and not part of the 14,200 MTU addressed in the proposed action. This number is based on the 2000 Nuclear Material Inventory Assessment data increased by approximately 10% to reflect uncertainties in material shipment. The plan will not include irradiated material, UF_6 , enrichment of 20% or greater ^{235}U , or ^{233}U .

Fig. 1. Location of Y-12 Complex and ETTP on the DOE's Oak Ridge Reservation.

DOE must determine the safest, most effective, and most efficient approach for the consolidation and storage of this material. Consideration will be given only to those locations (DOE and commercial) within the continental United States that have a long-term mission for the handling and storage of uranium material. This material would be stored in either one (centralized) location or several (consolidated) locations. Approximately 14,200 MTU may be consolidated into one or more storage locations. This material is the primary focus of this PEA. Several alternatives were evaluated in detail for the Draft PEA prepared for this project (DOE 2002).

1.3 ECOLOGICAL DESCRIPTION OF THE SITES

1.3.1 Y-12 Complex

The Y-12 Complex (formerly the Y-12 Plant) is one of three installations on the DOE ORR. The early missions of the site included separation of ^{235}U from normal uranium by the electromagnetic separation process and manufacturing weapons components from uranium and lithium (DOE 2001a).

During 2000, the U.S. Congress established the National Nuclear Security Administration. Its mission is to carry out National Security responsibilities of DOE (DOE 2001b).

1.3.1.1 Water resources

The Y-12 Complex is approximately 3 km (2 miles) from the Melton Hill Reservoir and Clinch River. On-site, two streams originate approximately in the middle of the complex. Bear Creek flows directly west from its headwaters at the Y-12 Complex, while EFPC flows east before turning north and west and flowing through the residential area of Oak Ridge. These two creeks merge near ETTP, which is approximately 16 km (10 miles) west of the Y-12 Complex. The major groundwater unit for the ORR is the Knox Aquifer, composed of the Knox Group and the Maynardville Limestone. No aquifers are considered sole-source aquifers (DOE 1997a).

1.3.1.2 Ecological resources

The ORR consists of diverse habitats and supports a rich variety of flora and fauna. Vegetation is characteristic of that found in the inter-mountain regions of central and southern Appalachia. The Y-12 Complex is covered in mowed grass, concrete, gravel, asphalt, and industrial structures. Thus, the site does not have unique habitats or a wide diversity of flora or fauna. Upper East Fork Poplar Creek (UEFPC) lacks riparian vegetation because much of the stream is channelized and maintained. Lake Reality is a 1.0-hectare (2.5-acre), plastic-lined, flat-bottomed settling and spill control structure located near the east end of the facility on EFPC. Upper Bear Creek is also channelized, but, generally, it has somewhat better habitat quality and a better-defined riparian zone than UEFPC. There are mature hardwood forests in upper Bear Creek valley within 1.6 km (1.0 mile) of the Y-12 Complex. There is a small wetland [0.18 hectare (0.45 acre)] in a small, wooded area between New Hope Cemetery and Bear Creek Road. Bear Creek valley contains several wetlands that cover a total area of several hectares.

There are no federally protected threatened or endangered species known on the Y-12 Complex. However, the FWS notes that the federally listed endangered species—the gray bat (*Myotis grisescens*), the Indiana bat (*Myotis sodalis*), and the pink mucket (*Lampsilis abrupta*)—are known from, or have the potential to occur within, the project impact areas on the ORR. Although surveys for protected species are not comprehensive enough to rule out all possible federal- or state-listed vertebrates, the likelihood of finding such species seems very low (DOE 1998a).

1.3.2 East Tennessee Technology Park

ETTP, formerly known both as the Oak Ridge Gaseous Diffusion Plant and as the Oak Ridge K-25 Site, is located in Roane County, Tennessee, and is one of three large facilities on the ORR. The site is located on a level, 607-hectare (1500-acre) tract of land near the confluence of Poplar Creek and the Clinch River. ETTP is approximately 56 km (35 miles) west of Knoxville and approximately 13 km (8 miles) southwest of the city of Oak Ridge.

1.3.2.1 Surface water

ETTP is directly adjacent to the Clinch River along the northwest boundary of the ORR. Poplar Creek is a moderately wide [9- to 21-m (30- to 70-ft)] stream that enters the north side of ETTP about 0.5 km (0.3 mile) downstream of the confluence of the east and west forks of Poplar Creek (DOE 1997b). The lower reach of Poplar Creek meanders sharply along the southwest side of ETTP and enters the Clinch River.

The Tennessee Valley Authority (TVA) performed an analysis of floods on the Clinch River and Poplar Creek. TVA concluded that most of ETTP is above the probable maximum flood level. The only facilities identified at risk during major floods were the K-25 power plant and the pumping station for ETTP's water filtration plant. The source of flooding at ETTP would be backwater from the Clinch River near the confluence of Poplar Creek. All proposed storage locations are above the 100-year flood level.

1.3.2.2 Ecological resources

The ORR consists of diverse habitats and supports a rich variety of flora and fauna. Vegetation is characteristic of that found in the intermountain regions of central and southern Appalachia. Vegetation around the buildings within the fenced area on the ETTP proper is a mixture of mowed grasses with a few shrubs and trees. Many of the shrubs and trees have been planted as landscaping, although some native species are found in unmowed areas around ponds and waterways. There are several hectares of wetlands in and around ETTP. The Lower Poplar Creek Rookery is the only environmentally sensitive area within ETTP. It is approximately 2.6 hectares (6.5 acres) and is located on the north bank of Poplar Creek in the middle of the plant site.

Since ETTP proper is planted primarily in non-native grasses, it has very little habitat available for native animals except along Poplar Creek. The majority of animal species found within ETTP's boundaries are species that adapt well to disturbance and the presence of humans. There are no known federally protected plant or animal species on the ETTP site, although suitable habitat exists for the endangered bald eagle on Melton Hill Reservoir and the Clinch River. Sixteen plant species and 18 animal species that are considered rare, threatened, or endangered by the state of Tennessee are found on or near ETTP. However, the FWS notes that the federally listed endangered species—the gray bat (*Myotis grisescens*), the Indiana bat (*Myotis sodalis*), and the pink mucket (*Lampsilis abrupta*)—are known from, or have the potential to occur within, the project impact areas on the ORR.

2. ECOLOGICAL DESCRIPTION AND POTENTIAL IMPACTS OF THE PROPOSED PROJECT ON LISTED SPECIES

The general ecology of federally listed species that are known to occur near the site and the expected potential impacts on them from the project are summarized below. Unless otherwise noted, general biological

information on the species is derived from the published literature, reports, and Internet resources listed under each species heading.

2.1 GRAY BAT (*Myotis grisescens*)

Unless otherwise noted or referenced, the following general biological information on the gray bat is derived from FWS (1991), Harvey (1992), and Kentucky Bat Working Group (KBWG) [2000]. The core range of the endangered gray bat encompasses the cave regions of Alabama, northern Arkansas, Kentucky, Missouri, and Tennessee, but a few occur in northwestern Florida, western Georgia, southwestern Kansas, south Indiana, south and southwestern Illinois, northeastern Oklahoma, northeastern Mississippi, western Virginia, and possibly western North Carolina. Gray bats are restricted to caves or cave-like habitats, and few caves meet their specific roost requirements. These restrictions result in about 95% of the populations hibernating in only eight or nine caves. For hibernation, the roost site must have an average temperature of 5.6°C to 11.1°C (42°F to 52°F). Most of the caves used by gray bats for hibernation have deep vertical passages with large rooms that function as cold air traps. Summer caves must be warm, between 13.9°C to 25.0°C (57°F and 77°F), or have small rooms or domes that can trap the body heat of roosting bats. Summer caves are normally located close to rivers or lakes where the bats feed. Gray bats have been known to fly as far as 12 miles or more from their colony to feed.

Gray bats roost, breed, rear young, and hibernate in caves year-round. They migrate between summer and winter caves and will use transient or stopover caves along the way. One-way migrating distance between winter and summer caves may vary from as little as 16 km (10 miles) to well over 322 km (200 miles). Mating occurs as bats return to winter caves in September and October. By November most gray bats are hibernating. Adult females begin to emerge in late March, followed by juveniles and adult males. Females store sperm over the winter and become pregnant the following spring. A few hundred to many thousands of pregnant females congregate to form maternity colonies. Males and nonreproductive females gather in smaller groups to form what are known as bachelor colonies. A single pup is born in late May or early June. The young begin to fly 20 to 25 days after birth. Gray bats primarily feed on flying insects over lakes, rivers, and streams. Aquatic insects, particularly mayflies, make up most of their diet.

Information about the occurrence of gray bats on the ORR is limited. In November 1994, a single, dead gray bat was found in a display cabinet in a building at the Oak Ridge Y-12 Plant. The bat was probably an isolated, individual juvenile that became lost, disoriented, and trapped. Mist netting for bats was conducted on the Lower East Fork Poplar Creek (LEFPC) and its tributaries in May 1992 and again in May–June 1997 (Harvey 1997). The 1997 survey included portions of lower Bear Creek near its confluence with LEFPC. The creeks in this area provided good gray bat foraging habitat at the time of the surveys. No gray bats were recorded among the six species captured. More than 20 caves have been identified on the ORR. Seven of the caves (Copper Ridge, Flashlight Heaven, Walker Branch, Big Turtle, Little Turtle, Pinnacle, and Bull Bluff) were surveyed by Mitchell et al. (1996), but no gray bats were found. There is an unverified report of ten gray bats roosting in Little Turtle Cave in September 1996. These bats were observed roosting and were not further disturbed; therefore, a definite, in-the-hand identification was not made (Webb 1996). Examination of photographs taken of the roosting bats indicate that they appeared to be *Myotis* and more than likely were gray bats, but the species could not be positively determined [Major (2000) and Henry (2000)].

Although no caves are present within the area of the proposed project, several caves are located within 6.4 km (4 miles) of the proposed site location, and two of the caves are located within 2.4 km (1.5 miles). None of the caves has been completely and systematically surveyed for bats, except for the limited surveys reported in Mitchell et al. (1996) and the 1996 report of *Myotis* roosting in Little Turtle Cave. The caves within the vicinity of the project area may not provide adequate hibernacula for gray bats, but they could provide transient or stopover roosting habitat for migrating gray bats. Suitable foraging habitat for gray bats

within the vicinity of the proposed facility includes the Clinch River (Melton Hill Lake), which is located about mile south of the Y-12 complex. Both Bear Creek and East Fork Poplar Creek are narrow, small streams and are considered suboptimal for frequent foraging for gray bats.

Both the Y-12 Complex and ETTP are highly industrialized areas with little natural habitat that remains immediately surrounding the complex. No caves would be disturbed by the proposed action, and activities would also not directly impact any of the potential foraging habitat that exists in the vicinity. If construction of new facilities were required, it would occur only during the day, so any foraging by gray bats would not be disrupted. Activities associated with the operation of the proposed facility would also primarily occur during the day and would not disrupt any gray bats that might forage near the site. In addition, no significant emissions or effluents would be produced by the facility that could directly impact foraging gray bats or indirectly affect aquatic insect fauna on which the gray bats would prey. Thus, the proposed project is unlikely to adversely affect the gray bat or its habitat.

2.2 INDIANA BAT (*Myotis sodalis*)

Unless otherwise noted or referenced, the following general biological information on the Indiana bat is derived from FWS (1991, 1999a, 1999b, 2000), Harvey (1992), and KBWG (1997, 2000). The Indiana bat is a migratory species found throughout much of the eastern half of the United States from Oklahoma, Iowa, and Wisconsin east to Vermont and south to northwestern Florida. For hibernation, Indiana bats prefer limestone caves with stable temperatures of 3.3°C to 6.1°C (38°F to 43°F) and high relative humidity. As with the gray bat, few caves meet the specific roost requirements of the species. Subsequently, more than 85% of the population hibernates in only nine sites. However, Indiana bats have been found hibernating in a few abandoned mines, a tunnel, and a hydroelectric dam. The bats hibernate from October to April, depending on climatic conditions. Density in tightly packed clusters is usually estimated at 3228 bats per square meter (300 bats per square foot), although as many as 5165 bats per square meter (480 per square foot) have been reported.

Female Indiana bats depart hibernation caves before males and arrive at summer maternity roosts in mid-May. A single offspring is born between late June and early July. The young bats can fly within a month of birth. Early researchers considered floodplain and riparian forest to be the primary roosting and foraging habitats used during the summer by the Indiana bat, and these forest types unquestionably are important. More recently, upland forest has been shown to be used by Indiana bats for roosting. Within the range of the species, the existence of Indiana bats in a particular area may be governed by the availability of natural roost structures, primarily standing dead trees with loose bark. The suitability of any tree as a roost site is determined by (1) its condition (dead or alive), (2) the quantity of loose bark, (3) the tree's solar exposure and location in relation to other trees, and (4) the tree's spatial relationship to water sources and foraging areas. The most important characteristic of roost trees is probably not species but structure (i.e., exfoliating bark with space for bats to roost between the bark and the bole of the tree). To a limited extent, tree cavities and crevices are also used for roosting. Maternity colonies use multiple primary roost trees, which are used by a majority of the bats most of the summer, and a number of "secondary" roosts, which are used intermittently and by fewer bats, especially during periods of precipitation or extreme temperatures. The summer roost of adult males is often near maternity roosts, but where most spend the day is unknown. Others remain near the hibernaculum, and a few males are found in other caves during summer. Researchers have found that primary roosts are generally in openings or at the edge of forest stands, while alternate roosts can be either in the open or in the interior of the forest stands. Indiana bats use roosts in the spring and fall similar to those selected during the summer. During the fall, when Indiana bats swarm and mate at their hibernacula, male bats roost in trees nearby during the day and fly to the cave during the night.

Indiana bats forage in and around the tree canopy of floodplain, riparian, and upland forest. In riparian areas, Indiana bats primarily forage around and near riparian and floodplain trees (e.g., sycamore, cottonwood, black walnut, black willow, and oaks), and solitary trees and forest edge on the floodplain. Streams, associated floodplain forests, and impounded bodies of water (e.g., ponds, wetlands, and reservoirs) are preferred foraging habitat for pregnant and lactating Indiana bats, some of which may fly up to 1.5 miles from upland roosts. Indiana bats also forage within the canopy of upland forests, over clearings with early successional vegetation (e.g., old fields), along the borders of croplands, along wooded fencerows, and over farm ponds in pastures. Indiana bats return nightly to their foraging areas. Indiana bats feed strictly on flying insects, and their selection of prey items reflects the environment in which they forage. Both aquatic and terrestrial insects are consumed. Moths, caddisflies, flies, mosquitoes, and midges are major prey items. Other prey include bees, wasps, flying ants, beetles, leafhoppers, and treehoppers. During September, the bats depart for hibernation caves.

Information about the occurrence of Indiana bats on the ORR is limited. Mist netting for bats was conducted on LEFPC and its tributaries in May 1992 and again in May–June 1997 (Harvey 1997). The 1997 survey included portions of lower Bear Creek near its confluence with LEFPC. The creeks in this area provided Indiana bat summer roosting and foraging habitat at the time of the surveys. No Indiana bats were recorded among the six species captured.

In Tennessee, the nearest hibernating population of Indiana bats exists in White Oak Blowhole Cave, located in Blount County in the western end of the Great Smoky Mountains National Park. This cave has been designated as critical habitat for this species. A few Indiana bats also hibernate in Bull Cave, also located in Blount County. No maternity roosts have been located on the ORR, or as yet in Tennessee. However, in July 1999, a small colony of Indiana bats was discovered roosting in a dead hemlock tree on the Cheoah Ranger District of the Nantahala National Forest in Graham County, North Carolina. This discovery represents the first record of a reproductive female Indiana bat being found south of Kentucky. Recent collections of individual Indiana bats have also been recorded from the Cherokee National Forest near Tellico Lake in Monroe County, Tennessee. These reports indicate that summer colonies of the species may be present in east Tennessee. The habitat from which these individuals were collected is similar to suitable habitat found on the ORR.

Although there is no suitable summer roosting habitat for the Indiana bat on the ORR, there is probably suitable habitat along forested portions of Chestnut Ridge and Pine Ridge, which border the Y-12 complex to the south and north, respectively, in upper Bear Creek Valley. Suitable foraging habitat for Indiana bats within the vicinity of the proposed facility includes the Clinch River (Melton Hill Lake) and Poplar Creek at ETPP. Upper Bear Creek and EFPC are narrow, small streams and are considered suboptimal for frequent foraging for Indiana bats. Although unlikely, a maternity colony, an adult male colony, or individual Indiana bats could use roosting habitat located in the vicinity of the proposed project in upper Bear Creek Valley. Any potential adverse impacts to the Indiana bat would be eliminated by not cutting down any trees during the Indiana bat's summer roosting season from May through September. Such actions should prevent the loss of any bats that otherwise might be using the trees for rearing young and should also eliminate the need for mist netting or detailed surveys.

Both the Y-12 Complex and ETPP are highly industrialized areas with little natural habitat that remains immediately surrounding the complex. Additional clearing of the woodland at either site should not affect bats because of the poor quality habitat. If new construction was required, these activities would also not directly impact any of the potential foraging habitat that exists in the vicinity. Any construction activities would occur only during the day, so any foraging by Indiana bats would not be disrupted. Activities associated with the operation of the proposed facility would also primarily occur during the day and would not disrupt any foraging Indiana bats near the site. In addition, no significant emissions or effluents would be

produced by the facility that could directly impact foraging Indiana bats or indirectly affect aquatic insect fauna that the Indiana bats would prey on.

2.3 PINK MUCKET (*Lampsilis abrupta*)

The endangered pink mucket (also called pink mucket pearlymussel, *L. orbiculata*) is a freshwater mussel in the Unionidae family (CMI–FWIE 2002; EPA 2000). The pink mucket is found in medium to large rivers. It seems to prefer larger rivers with moderate to fast-flowing water, at depths from 0.5 to 8.0 m (1.6 to 26.2 ft). The species has been found in substrates including gravel, cobble, sand, or boulders. Silt clogs the species' siphon so silty substrates and water columns are not conducive to the species being present. Habitat of the glochidia is initially within the gills of the female, then in the water column, and finally attached to a suitable fish host. Habitat requirements for the juvenile stage are unknown. Any alteration of the life-stage-specific habitats during the pink mucket's lifecycle would likely affect the long-term success of a population. In addition, impoundments and surface water contaminants are known to adversely affect this species and contribute to its decline in numbers.

The species has an elliptical-shaped shell and is generally about 10.2 cm (4 in.) long, 6.1 cm (2.4 in.) wide, and 7.6 cm (3 in.) high (CMI–FWIE 2002; EPA 2000). The valves are heavy and thick. The species is sexually dimorphic, with both males and females having rounded anterior margins, but with males having a pointed posterior margins and females a truncated, expanded posterior to accommodate the gravid condition. Young mussels have a yellow to brown shell that is smooth and glossy with green rays, while older specimens are dull brown. The nacre color varies from white to pink, with the posterior margin iridescent. The early life stage of the mussel, glochidia, is an obligate parasite on the gills or fins of fish, but the required fish host species are unknown. The adult mussels are filter feeders and consume particulate matter that is suspended in the water column. Identifiable stomach contents from mussels invariably include mud, desmids, diatoms, protozoa, and zooplankton. However, studies on the food habits for this species have not been conducted, so its specific food requirements are not known. The species has no known commercial value. The reproductive cycle of the pink mucket is presumed to be similar to that of other freshwater mussels. Males release sperm into the water column, which is then taken up by the females during siphoning and results in the eggs being fertilized. The embryos develop into the glochidia inside the female and are then released into the water column. The glochidia must then attach to a suitable fish host for metamorphosis to the free-living juvenile stage. There is no information on the population biology for this species.

Currently, the pink mucket is known in 16 rivers and tributaries from 7 states, with the greatest concentrations in the Tennessee (Tennessee, Alabama) and Cumberland (Tennessee, Kentucky) rivers and in the Osage and Meramec rivers in Missouri. Smaller populations have been found in the Clinch River (Tennessee); Green River (Kentucky); Kanawha River (West Virginia); Big, Black, and Little Black and Gasconde rivers (Missouri); and Current and Spring rivers (Arkansas). The FWS indicated that the pink mucket is known to occur near the project area (FWS 2002). Pink muckets have been found in the Clinch River adjacent to the ORR. However, pink muckets have not been observed at the Y-12 Complex or ETTP. Furthermore, the aquatic habitat in the streams closest to the proposed facility (Bear Creek, and EFPC) is not appropriate to support the pink mucket. Both are small streams with low flow. Both streams also receive low levels of various contaminant inputs from several sources. Appropriate engineering controls, administrative procedures, and emergency management protocols would prevent any releases and off-site migration of potential contaminants from either site. Therefore, the combination of unsuitable stream sizes, improper habitat, and presence of contaminants leads DOE to conclude that the presence of pink mucket pearlymussel on or near the Y-12 Complex or ETTP is extremely unlikely. Likewise, implementation of the uranium management program at the Y-12 Complex would not have any adverse impacts on this species.

3. REFERENCES

- CMI–FWIE (Conservation Management Institute–Fish and Wildlife Information Exchange). 2000. TN00194 Pink Musket Pearly Mussel *Lampsilis orbiculata orbiculata*, Tennessee Animal Biogeographic System (TABS). Web site: <http://fwie.fw.vt.edu/TN/TN00194.htm>. Date April 2000. Conservation Management Institute, College of Natural Resources, Virginia Tech, Blacksburg, Virginia.
- DOE (U.S. Department of Energy). 1997a. *Report on the Remedial Investigation of Bear Creek Valley at the Oak Ridge Y-12 Plant, Oak Ridge Tennessee, Volume I*, DOE/OR/01-1455/V1&D2, U.S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.
- DOE. 1997b. *Final Environmental Assessment, Lease of Land and Facilities within the East Tennessee Technology Park, Oak Ridge, Tennessee*, DOE/EA-1175, U.S. Department of Energy, Oak Ridge Operations, Oak Ridge, TN.
- DOE. 1998. *Report on the Remedial Investigation of Upper East Fork Poplar Creek Characterization Area at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee, Volume I*, DOE/OR/01-1641/V1&V2, U.S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.
- DOE. 1999. *Construction/Relocation of Access Road at Oak Ridge National Laboratory, Oak Ridge, Tennessee*, CX-TRU-98-007, U.S. Department of Energy, Oak Ridge Operations Office, Oak Ridge, Tennessee.
- DOE. 2001a. *Final Sitewide Environmental Impact Statement for the Y-12 National Security Complex*, DOE/EIS-0309, U.S. Department of Energy, Oak Ridge Y-12 Area Office, National Nuclear Security Administration.
- DOE. 2001b. *Wetlands Assessment, Reindustrialization Program at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*, December.
- DOE. 2002. *Draft Programmatic Environmental Assessment (PEA) for the U.S. Department of Energy, Oak Ridge Operations Implementation of a Comprehensive Management Program for the Storage, Transportation, and Disposition of Potentially Reusable Uranium Materials*, DOE/EA-1393. Prepared for the U.S. Department of Energy by Science Applications International Corporation, Oak Ridge, Tennessee, May.
- EPA (U.S. Environmental Protection Agency). 2000. "Pink musket pearly mussel [*Lampsilis orbiculata*]." Office of Pesticide Programs. Available at <<http://www.epa.gov/espp/arkansas/seviert.htm>>.
- FWS (U.S. Fish and Wildlife Service). 1991. *Endangered and Threatened Species of the Southeastern United States (The Red Book)*, FWS Region 4. February 1991.
- FWS. 1999a. *Indiana Bat*. Asheville Field Office. August 1999.
- FWS. 1999b. *Agency Draft Indiana Bat (Myotis sodalis) Revised Recovery Plan*. Fort Snelling, Minnesota. 53 pp.
- FWS. 2000. *The Indiana Bat in Western North Carolina, A Status Summary Update*. Asheville Field Office. April.

- FWS. 2002. Letter from Dr. Lee A. Barclay, U.S. Fish and Wildlife Service, Cookeville, Tennessee, to Mr. David Allen, U.S. Department of Energy, Oak Ridge, Tennessee, June 10.
- Harvey, Michael J. 1992. *Bats of the Eastern United States*. Arkansas Game and Fish Commission and U.S. Fish and Wildlife Service. February. 46 pp.
- Harvey, Michael J. 1997. *Survey for Endangered and Threatened Bats on Parcel ED-1, Oak Ridge Reservation*. July. 24 pp.
- Henry, Hill. 2000. Personal communication from Hill Henry, Tennessee Valley Authority, to Mike Deacon, Science Applications International Corporation, May 4, 2000.
- KBWG (Kentucky Bat Working Group). 1997. "Protection and Enhancement Plan for the Indiana Bat." Available at <<http://www.biology.eku.edu/bats/indbat-recmanageplan.htm>>. June 1997.
- KBWG. 2000. "The Bats of Kentucky." Available at <<http://www.biology.eku.edu/bats>>.
- Major, Smoot. 2000. Personal communication from Smoot Major, Tennessee Department of Environment and Conservation, Division of Natural Heritage, to Mike Deacon, Science Applications International Corporation, May 4, 2000.
- Mitchell, J. M., E. R. Vail, J. W. Webb, J. W. Evans, A. L. King, P. A. Hamlett. 1996. *Survey of Protected Terrestrial Vertebrates on the Oak Ridge Reservation*, ES/ER/TM-188/R1, Final Report. Oak Ridge National Laboratory, Oak Ridge, Tennessee.
- Sousa, P.A., DuVall, G.D., Tinker, N., and Hart, M.J. 2001. *Cultural Resource Management Plan, Department of Energy Oak Ridge Operations Office, Anderson and Roane Counties, Tennessee*. DOE/ORO-2085.
- Webb, Warren. 1996. Personal communication with Deborah Awl, JAYCOR , September 18, 1996.